Amendments to the Specification

Applicants respectfully request the following amendments to the specification be entered. The amendments are shown on a number paragraph basis.

[0021] Refer to FIG. 1, which illustrates a CDMA-2000 communication system 100 and components thereof. Mobile subscriber (MS, 110) is serviced by base station (BTS, 120) and base station controller (BSC, 130). The BSC 130 communicates with a mobile switching center (MSC, 140) in A1/A2 communication protocol. The system allows the subscriber to carry out a data communication session facilitated by a packet data server, also referred to herein as a packet data servicing node (PDSN, 160), over IP network 170. Packet control function (PCF, 150) is an entity that supplies A10/A11 communication between BSC 130 and PDSN 160. Home Agent (HA, 180) is used to keep subscriber-specific data and controls the interaction between subscribers and their home (institution) networks and foreign agents. Authentication, Authorization, and Accounting (AAA) Server 190 provides the system with knowledge of the subscriber's subscription and service details relating to access and billing.

[0032] Refer to FIG. 3, which illustrates a portion of the data session establishment process shown in FIG. 2. PCF 150 and PDSN 160 exchange the earlier-mentioned A11 registration request 210 and reply 212. Then, before allowing PDSN 160 to send out the initial LCP configuration request 220, PDSN 160 waits for a period of time t_1 216 to allow air link 215 to be established. During the wait time period, PDSN 160 refrains from sending initial LCP configuration request 220. The wait time t_1 216 may be a pre-determined fixed time, or a time determined on the basis of some network condition. t_1 216 could be stored or calculated within PCF 150 and/or PDSN 160. It should be noted that, in this embodiment, t_1 216 is not necessarily decided by the actual duration of time it takes to establish a particular air link, but rather by an appropriate duration that would reasonably be expected to allow for an air link 215 to be established in most or all instances in a given network configuration. Wait time t_1 216 is provided to PDSN 160 or stored therein.

[0033] The set or programmable wait time t_1 216 can be made to depend on factors such as IP addresses of the communicating components, their physical or network separation, environmental, network conditions, etc., and the wait time can be stored in a look-up table or calculated dynamically using some algorithm. To achieve further performance gains, this

embodiment can be programmed so that if any data packets are received by PDSN 160 from the MS 110/PCF150 client, then PDSN 160 should immediately proceed with the transmission of messages to the MS 110/PCF150 client, as it is established that air link 215 is up and operational. Therefore, there is no need for an initial wait period if it is clear that an air link has already been set up.

[0034] Wait time t_1 216 can also be determined by PDSN 160 "pinging" (sending a test signal to) PCF 150 and calculating the network propagation time from the time it takes to get a response to its ping. Those skilled in the art will appreciate various methods for determining network conditions and signal propagation times for use in the wait time determination. Still another factor that can be used in determining the appropriate wait time would be from knowledge of MS 110's radio access technology, which can be signaled using the 3GPP2's "service option" in the A11 registration request message 210.

[0036] Refer to FIG. 4, which illustrates establishment of a data session, data packet communication 222a, a communication error event 300, error recovery 317, and subsequent renegotiation of the failed session 318. PCF 150 and PDSN 160 exchange the earlier-mentioned A11 registration request 210 and reply 212. The initial LCP configuration request 220 from PDSN 160 is sent before air link 215 is established, and is lost. PDSN 160 then waits a short (e.g. 10-100 milliseconds) wait time .t_1 219a and retransmits an LCP configuration request 220a. As air link 215 is not yet established, PDSN 160 waits yet another time duration t_1 219b and retransmits yet another LCP configuration request 220b. PDSN 160 repeats its attempts to deliver the LCP configuration request until an air link 215 is established and its attempts succeed or another abort event occurs. In the example of FIG. 4, an air link 215 is established after two unsuccessful attempts, and LCP configuration request 220b is successfully delivered. This phase of the session took approximately two t_1 periods (e.g., 200 milliseconds) instead of the long (e.g., 3 second) time-out duration of presently used systems. Any redundant LCP request messages sent following successful session initiation can then be ignored by the PPP stacks. Once air link 215 and the data session are operationally negotiated, data packets can be exchanged as is commonly done in CDMA-2000 systems.

[0037] Now assume an error event 300 occurs in the normal course of communication. Unlike the missed initial (session establishment) LCP configuration packets, dropped data packets in the course of data session communication usually indicate a substantive fault condition that takes a finite reset time (time-out) from which to recover. Therefore, a longer wait time t_2 316a (e.g. 1-3 seconds) is used before attempting to renegotiate the session to allow for recovery from the error condition. PDSN 160 waits the period t_2 316a and sends a new LCP configuration request 320 and receives a LCP configuration reply 321 in the same or similar way that the initial LCP configuration exchange 220-221 was made.

[0038] It should be appreciated that the two short wait times t_1 (219a and 219b) of FIG. 4 are not necessarily identical. FIG. 5 illustrates an embodiment similar to that of FIG. 4, except that the two short wait times (indicated as t_1 219c and t_{1a} 219d in FIG. 5) are not of equal duration. In this embodiment, each of wait times t_1 219c, ,t_{1a} 219d and t_2 316b are of a different duration.

[0040] Refer to FIG. 6, which illustrates a data session setup process where PCF 150 has a buffer 400 that stores data packets 402 sent by PDSN 160 as indicated in time period 214 while PCF 150 establishes radio air link 215 with MS 110. Therefore, when air link 215 is delayed, data (including LCP configuration request 220) from PDSN 160 are not lost. The data can be delivered to MS 110 following establishment of air link 215.

[0044] Refer to FIG. 7, which illustrates a process for establishing a data session, including a step of sending Air Link Start signal 700 from PCF 150 to PDSN 160 only after air link 215 is established. The wait time for "air link start" signal 710 denotes the time between the sending of registration request 210 and the sending of air link start signal 700 by PCF 150. Upon receiving Air Link Start signal 700, PDSN 160 sends its initial LCP configuration request 220 as discussed previously. This avoids sending the initial LCP configuration request 220 too early, which might result in a delay in session establishment due to the time-out described above.